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The evolution and convergence of the government expenditure composition in the OECD countries: an analysis of the functional distribution

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Abstract

This paper explores the existence of convergence in the structure of government expenditure by functions in the OECD countries for the period 1970-1998 and the prospects of this process persisting in the future. The results obtained first through the similarity index and afterwards using the usual convergence indicators, adapted to the analysis of the breakdown of public expenditure, point to the existence of a distribution approximation. Nevertheless, we have found that the majority of expenditures were near to the steady-state, which differs across countries. This suggests that there are some individual factors that impede convergence to a single structure in the long run.

JEL: H500, H600.

Keywords: Government Spending, Convergence, Functions of the public expenditure, OECD.

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1. INTRODUCTION

Since 1980, several articles have analysed the impact of the size of public sector on economic growth without obtaining concluding results[1]. With the development of the endogenous growth models, the composition of the government expenditures -above all the percentage of these allocated to productive expenditures- has been considered as one of its determinants (Barro, 1990). Thus, there is a consensus about the positive effect of the public investment and the negative effect of consumption on economic growth (Sturm, 1998).

However, as pointed out by Chu *et al.*(1995), Devarajan, Swaroop and Zou (1996) and Tanzi and Zee (1997), in order to analyse the impact on economic growth the functional breakdown of public expenditure is more relevant[2]. In this sense, the purpose of the research of which this article forms part is to estimate the elasticities of economic growth with respect to the components of public expenditures using a broader disaggregation than its differentiation between productive and non-productive components.

Hence, and as a previous step to the formulation and contrast of a endogenous growth model, this article evaluates the convergence of the functional breakdown of public expenditures in the developed countries in the last three decades. The results obtained will be of great interest to analyse, in first place, the disparities of public expenditure composition as a factor explaining the difference in the long-run economic growth rates, and, in second place, if the progress in co-ordination of fiscal policy

[1] Agell, Lindh and Ohlsson (1997 and 1999), obtain this conclusion in their survey about the effects of the fiscal policy on economic growth including their own empirical analysis.

[2] Among productive expenditures Bleaney, Kneller and Gemmell, (1999) include those devoted to health general administration services, public order, education, defence, transport and communication and housing.

stemming from growing economic globalisation has affected the functional breakdown of public expenditure.

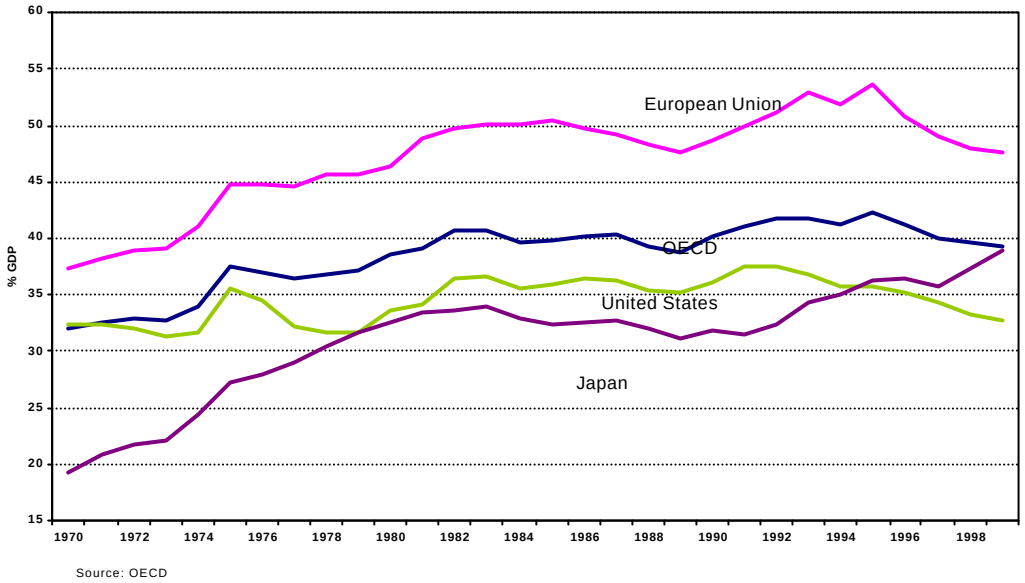
With this purpose, the second section examines the evolution of the share of public expenditures in the GDP and its composition in the last three decades, using the six categories of the productive expenditures, and two more considered as non productive: social security and others. Afterwards, the third section evaluates convergence in the structure of government spending adapting to the analysis the usual indicators in the literature of convergence in per capita income. Moreover we investigate if there is still margin for aligning the share of each functional category in the total amount of public expenditures in the OECD countries. Finally, in the fourth section, we set forth the main conclusions obtained.

2. THE SIZE AND COMPOSITION OF GOVERNMENT EXPENDITURE.

During the period 1970-1998 public expenditure has increased its share in the GDP of OECD countries from 32% in 1970 to almost 40% in 1997. However, this expansion has fluctuated in the course of the three decades (figure 1). In fact, there are four difference intervals. The first one covers the decade of the seventies and the early years of the eighties, in which public expenditure increased its share constantly. This trend is interrupted in 1983 until the end of the eighties, which is the second period. Precisely, at the beginning of the nineties public expenditure increased its importance again in the GDP until 1995, the peak for the whole period[3]. Thereafter, there is a reduction in the public expenditure share as a result of the fiscal discipline implemented in the OECD countries. Certainly, the important size attained in the previous interval and the threat to the sustainability of the public finance, has been reflected on the Stability and Growth Pact (1996) of the European Union (EU) and the Balanced Budget Amendment in the United States (1997).

[3] Saunders (1993) and Tanzi and Schuknecht (2000) analyse in detail the trends in the size and scope of the public sector in developed countries, and give some explanations about its determinants.

Figure 1. Trend in the Public Expenditure in the OECD countries (1970-1998, % GDP)



Source: OECD

The EU trend coincides with the one described for the OECD as a whole. This is also the case of Japan, barring the last few years, probably because of the economic crisis in the country. In the United States, finally, the periods outlines for the rest of the countries begin earlier. Certainly, there is more similarity between the trend of the EU and Japan or the United States than between these two last countries[4]. Once we have explored the trend in the share of public expenditures, it is of great interest to examine whether the OECD member states have harmonised the functional distribution of their public expenditures. For this purpose, we will use the intervals analysed for the size of public spending: the decade of the seventies, the eighties and the nineties.

Thus, we have computed, in first place, the similarity index, through the comparison of the shares of functions in the total amount of public expenditure of each country with the average:

[4] The temporal correlation indices of the public expenditure share are: EU and Japan: 0,89; EU and United States: 0,78; Japan and United States: 0,50.

$$SIG_t = \frac{1}{8n} \sum_{f=1}^{8} \sum_{i=1}^{n} \left[\frac{G_{fit} \Big/ \sum_{f=1}^{8} G_{fit}}{\sum_{i=1}^{n} G_{fit} \Big/ \sum_{f=1}^{8} \sum_{i=1}^{n} G_{fit}} - 1 \right] \qquad (1)$$

where:

G_{fpt}: General government expenditure of country i in the function f in the year t measured in current euros.

s: 8 functions of government expenditure taken from the Classification of the Functions of the Government (COFOG)(see UN, 1988); productive expenditure includes: health, general administrative services and public order -grouped as public services-,education, defence, housing and transport and communications. Non-productive expenditure includes: social security and other non-productive spending (summing up Recreational, cultural and religious affairs, all the Economic Activities, except transport and communications, -that is Fuel and energy; Agriculture, forestry, fishing and hunting; Mining, manufacturing and construction and Other economic affairs- and Others functions - basely interest payments-) .

n: 26 OECD members as at 31 December 1998, except Hungary, Poland and Czech Republic.

t: all the years of the period 1970-1997.

This index can be also computed for each of the functions, reflecting the similarity of the share in total public expenditure:

$$SIG_{ft} = \frac{1}{n}\sum_{i=1}^{n}\left[\frac{G_{fit} \Big/ \sum_{i=1}^{8} G_{fit}}{\sum_{i=1}^{n} G_{fit} \Big/ \sum_{f=1}^{8}\sum_{i=1}^{n} G_{fit}} - 1\right] \qquad (2)$$

Note that index (1) and (2) are closely related, since the former can be obtained as a simple average of the sum for each function of the latter. In addition, this index has a minimum- 0, which means complete similarity- although it has no maximum[5].

The source used is the OECD: *National Accounts. Volume II: Detailed Tables.* The authors have chosen this source because the data is consolidated for all levels of public administration and it is constructed on an accrual basis[6]. Nevertheless, we have also national agencies data, OECD and World Bank country reports, Eurostat :*General Government Accounts and Statistics* and IMF, namely *Government Finance Statistics*[7], in order to complete the time series. Finally, for two countries as France and Japan we have made some estimations for the period 1970-74 and for some missing years.

[5] Suppose the case of *n-1* countries devoting no resources and only one country allocating some amount of its budget to one concrete function. Then, the average share of this function would be near zero and, inversely, the index would be very large.

[6] We have take in account the critics contained in Florio (1998) about OECD: National Accounts homogeneity in the treatment of interest payments among countries, comparing this item with other international and national sources.

[7] The data provided by the IMF is not generally consolidated for all levels of government. Therefore, it was necessary to subtract the transfers between different administrations (see Easterly and Rebelo, 1993 for a discussion about the limitations of the data provided by IMF). In addition to this, the *Government Finance Statistics* elaborates the data using cash basis accounting.

TABLE 1. Similarity Indexes of the functions of government expenditure in the OECD 1970-1997

	70-79	80-89	90-97
Health	0,27	0.26	0.26
Public services	0.32	0.30	0.26
Social security	0.34	0.33	0.31
Education	0.22	0.16	0.19
Defence	0.56	0.55	0.51
Transport and communications	0.49	0.44	0.39
Housing	0.50	0.46	0.48
Other	0.43	0.39	0.38
Total	0.39	0.36	0.35

Source: own elaboration on the basis of OECD, National Agencies, World Bank, IMF and Eurostat data

So, as can be seen in table 1, the OECD countries have approached their functional distribution in the last three decades. This process took place during the fiscal expansion of the public expenditure –the seventies- whilst in the eighties and nineties ceased. Nevertheless, this development was not homogenous for each function. Thus, public services, social security, defence and transport and communications expenditures have reduced constantly the index whilst education and housing has even increased disparities in the last decade. However, education is still the most similar jointly with public services, which has reduced its disparities more significantly. Housing and defence, on the contrary, are the most different.

Precisely, the evolution described for the harmonising process of public expenditure distribution coincides with the one drawn out for the size of the public sector. Actually, there is a negative and significant correlation coefficient (–0,86). This result indicates that during fiscal expansion the countries harmonise their functional distribution, while the years characterised by fiscal discipline the dissimilarity increased. That is to say that there are idiosyncratic effects that cause differences in the composition of fiscal adjustment among OECD countries. This is an important difference with the behaviour of public expenditure distribution by economic type – which takes into account if it is consumption, investment or transfers-. In fact, fiscal

adjustments take place reducing investments because, as pointed out by Kamps (1985), political reasons make it easier to diminish this chapter[8].

In short, during fiscal expansions harmonisation took place in the composition of government expenditure by functions in the developed countries.

3. CONVERGENCE IN THE COMPOSITION OF GOVERNMENT EXPENDITURE

The analysis of convergence in the composition of government expenditure in OECD countries during the period 1970-1997 will be carried out by means of the usual indicators in the literature of per capita income convergence (Barro and Sala-i-Martin, 1990 y 1992, De la Fuente, 2000), adapted to the examination of the functional distribution of public spending.

Thus, we have started with the estimation of β convergence, with the object of evaluating whether countries having more share in one particular function increase (decrease) this percentage to a lesser (greater) extent than countries in which this function is not so important. The estimated equation is:

$$\ln\left(\frac{g_{fi,t}}{g_{f,t}}\right) - \ln\left(\frac{g_{fi,t-1}}{g_{f,t-1}}\right) = \alpha_{fi} - \beta_f\left(\frac{g_{fi,t-1}}{g_{f,t-1}}\right) \qquad (3)$$

where:

g_{fit}: share of the function f in the total government expenditure of a country i in the year t.

[8] Henrekson (1988) in the case of Sweden and Sturm (1998) for the OECD member states find that fiscal adjustment affects particularly investments. However, Alesina and Perotti (1995) show that adjustments based on social transfers and the wage component of public consumption are more persistent than the ones based on investments reduction and earned income tax increases. In addition, and contrary to general belief, Alesina, Perotti and Tavares (1998) point out that governments implementing the first type of adjustment obtain stronger electoral support.

α_{fi}: constant that differs for each country i.

β_f: coefficient reflecting the existence and the speed of convergence.

t: years of the period 1970-1998

Therefore, if the coefficient β takes a negative and significant value, there has been a convergence process in the function. Inasmuch as we have a data panel available, we have obtained the within estimators –fixed effects- and Generalised Least Squares (GLS) -random effects- of the expression (3). Thereafter, we have contrasted the null hypothesis of non- correlation between unobservable effects and explicative variables. If the hypothesis is rejected the single unbiased estimator will be the within one, while if not rejected, in addition to being unbiased, the GLS will be the most efficient.

Still, there are two types of convergence β, the conditional and absolute. The former is less restrictive, since it takes into account other specific factors of each country, while the latter requires the existence of convergence even without considering other variables. So, there would be absolute convergence if the GLS estimator is consistent or in the case in which only the within estimator is consistent, we could not reject the hypothesis of a single constant for all the countries (De la Fuente, 2000). Thus, in the steady state:

$$\ln\left(\frac{g_{fi,t}}{g_{f,t}}\right) - \ln\left(\frac{g_{fi,t-1}}{g_{f,t-1}}\right) = 0 \qquad (4a)$$

this system is stable when β varies between 0 and –1. If we substitute in (3) we obtain a value for the share of each function:

$$\ln\left(\frac{g_{fi,t-1}}{g_{f,t-1}}\right)^{*} = \frac{\alpha_{fi}}{\beta_f}$$

and

$$\left(\frac{g_{fi,t-1}}{g_{f,t-1}}\right)^{*} = e^{\alpha_{fi}/\beta_f} \qquad (4b)$$

Therefore, for absolute convergence it must be the case $\alpha_{fi} = \alpha_f \quad \forall$ i. If this condition is fulfilled for each function f, the OECD members will converge to the same functional distribution of government expenditure. On the other hand, if the

convergence is conditional, the individual effects will be different for each country[9], and consequently, each function will be converging to different shares of public expenditure. In this sense, if at least two functions exhibit conditional convergence, it means that the countries are approaching a steady-state with different distributions of public expenditures[10]. Precisely, it is possible to evaluate the future margin for convergence comparing the standard deviation of the values in the steady-state and the real values of the last year available. Finally, the estimations of the whole period are given jointly with each decade estimation in order to examine changes in the pattern of the convergence over the period 1970-1997.

So, the results given in Table 2 show, firstly, that there has been a convergence process in all the functions[11]. Moreover, and secondly, this convergence is absolute only in three cases: public services, housing and other expenditures. In fact, the consistent estimator for all the cases is the within estimator as can be inferred from the rejection of the Hausman Test. Furthermore, for all other functions, the F test rejects that the individual effects are the same for every country: they converge to different steady-states with distinct distributions of public expenditure. Country dummies reflect idiosyncratic effects that impede convergence to the identical composition of public expenditure. By functions, public services is again the one converging fastest (–0,25). Clearly, long time series provide reliable results but avoid the analysis of difference patterns in the speed of convergence over the period. Hence, we have tested the equality of the coefficients in the three decades.

[9] The individual effects has been recovered estimating by means of Ordinary Least Squares (OLS) the equation (3) including dummies for each country.

[10] Note that the sum of all the shares must be one hundred. Thus, if one function does not converge to the same percentage in every country, there must be at least another one with the same characteristic.

[11] The detailed results can be found in appendix 1.

TABLE 2. Results of the convergence estimation for the functional distribution of government expenditure in OECD 1970-1998.

Function	Method	β	Type of Convergence.	Ratio σ steady-state / real values
Health	WITHIN	-0.12 (-5.30)	Conditional	0.98
Public Services	WITHIN	-0.25 (-2.60)	Absolute	-
Social Security	WITHIN	-0.13 (-3.39)	Conditional	1.13
Education	WITHIN	-0.09 (-4.58)	Conditional	0.84
Defence	WITHIN	-0.18 (-7.94)	Conditional	1.17
Transport and Communications	WITHIN	-0.16 (-4.46)	Conditional	0.79
Housing	WITHIN	-0.20 (-2.76)	Absolute	-
Other	WITHIN	-0.09 (-2.88)	Absolute	-

In parenthesis White´s (1980) heterocedasticity consistent t-statistics

The analysis of the test on the equality of the speed of convergence is shown in Table 3. The functions present different behaviours. In first term, expenditures showing an absolute convergence, jointly with transport and communications, have had a statistically identical speed of convergence along the period. On the other hand, and in second term, the pace of the convergence in the case of defence has been different in the three decades. The rest of the functions show similar speed of convergence during most of the period.

TABLE 3. Results of the estimation for the speed of convergence of each function in the three decades in OECD member states.

	70-79	80-89	90-98	70s vs 80s	70s vs 90s	80s vs 90s
Health	-0.24 (-3.53)	-0.39 (-4.59)	-0.40 (-3.56)	≠	=	=
Public services	-0.13 (-0.91)	-0.76 (-2.97)	-0.63 (-2.20)	≠	=	=
Social Security	-0.68 (-4.73)	-0.46 (-2.97)	-0.20 (-1.00)	=	=	≠
Education	-0.20 (-2.82)	-0.32 (-4.75)	-0.28 (-4.32)	≠	=	=
Defence	-0.22 (-6.66)	-0.40 (-6.96)	-0.35 (-5.32)	≠	≠	≠
Transport and Communications	-0.35 (-3.92)	-0.27 (-3.40)	-0.31 (-3.73)	=	=	=
Housing	-0.37 (-3.01)	-0.36 (-4.10)	-0.43 (-2.39)	=	=	=
Other	-0.31 (-4.93)	-0.33 (-5.40)	-0.30 (-2.65)	=	=	=

As mentioned before, by comparing the standard deviation of the steady-state value with real values of the last year available -1997 in our case, it is possible to evaluate the future margin for β-convergence. The results shown in the last column of the Table 2, suggest that only in two of the eight functions there is still margin for convergence since the disparities of the steady-state values are smaller than for the real values of 1997: education and transport and communications expenditures. Health is very close to the steady-state, and it looks as if there is no more margin for convergence. On the other hand, social security and, above all, defence could at some point begin to diverge if they continue the patterns shown in the period 1970-1997.

Nevertheless, the existence of β-convergence is a necessary condition but not sufficient for convergence. It is the σ-convergence which ensures that there has been a convergence process. For this reason, we have computed the standard deviation of the logarithm of the specialised index of each function.

TABLE 4. σ-convergence (standard deviations of the logarithm of specialisation indices) of the shares of each function in the total amount of government spending in the OECD from 1970-1997.

	70-79	80-89	90-97
Health	0.34	0.39	0.40
Public services	0.29	0.26	0.24
Social security	0.43	0.44	0.35
Education	0.27	0.17	0.18
Defence	0.69	0.69	0.58
Transport and communications	0.42	0.40	0.36
Housing	0.59	0.56	0.59
Other	0.36	0.33	0.35
Total	0.58	0.58	0.55

The results obtained for the σ convergence, as can be shown in Table 4, confirm the existence of a harmonisation tendency in the functional distribution of government expenditures. Moreover, the data confirms the existence of convergence in every function -except health-, and that the share of education expenditure is the most similar among OECD countries, though the share of this function jointly with housing, have increased disparities in the last decades as pointed out already with the similarity index. Public services again show the fastest harmonisation.

Finally, we have calculated the Kendall index with the object of analysing whether there are significant changes in the rankings. These rankings classify the countries of the OECD according to the importance that each function has in its total government expenditure. This is known as γ-convergence. The Kendall index can be computed in two ways, as pointed out by Boyle and McCarthy (1997, 1999). The first one takes into account only the initial and last year of the period examined -binary index-, and the second one considered what happens in all the intermediate years. The

result is, consequently, two time series of Kendall index for each function. The analytical expressions are:

$$g_t^m = \frac{\text{var}\left(\sum_{t=0}^{T} \text{rank}\ g_{fit}\right)}{(T+1)^2\ \text{var}\left(\text{rank}\ g_{fi0}\right)} \qquad (5)$$

$$g_t^b = \frac{\text{var}\left(\text{rank}\ g_{fit} + \text{rank}\ g_{fi0}\right)}{4\ \text{var}\left(\text{rank}\ g_{fi0}\right)} \qquad (6)$$

TABLE 5. Convergence γ (Kendall multi-annual and binary indexes of each function of government expenditure in OECD countries.

	70-79	80-89	90-97
Health	0.95	0.83	0.79
	0.94	0.76	0.74
Public services	0.93	0.83	0.77
	0.94	0.83	0.78
Social Security	0.97	0.94	0.90
	0.94	0.86	0.79
Education	0.95	0.90	0.81
	0.94	0.90	0.79
Defence	0.98	0.95	0.94
	0.97	0.94	0.92
Transport and communications	0.92	0.86	0.82
	0.90	0.85	0.77
Housing	0.95	0.82	0.77
	0.94	0.81	0.72
Other	0.96	0.89	0.82
	0.96	0.88	0.76
Average	0.95	0.88	0.83
	0.94	0.86	0.79

The results for γ convergence, shown in Table 5, indicate that there has been an important movement in the rankings of the importance that functions have in each

country, measured as the share in total public expenditure[12]. Thus, public services is again the function showing the greatest convergence. Health and housing reflect also a relevant change in their ranking during the period 1970-1997. In contrast, the expenditure having most disparities at the beginning of the period -defence- and the larger share in the total public spending –social security- present less mobility in their particular classifications. These characteristics makes more difficult for the countries to change positions in the ranking. Furthermore, the two functions mentioned reflect idiosyncratic and institutional factors, such as the roll of the State in economic activity and the creation of the Welfare State.

4. CONCLUSIONS

In the present research we have explored the convergence of the functional distribution of government expenditures and the prospects of this process continuing in the near future.

The results obtained, first through similarity index and later adapting the usual indicators of convergence (β, σ and γ) to the analysis of government expenditure composition, reveal that there has been an alignment of its functional distribution among OECD countries in the period 1970-1998. Moreover, this harmonisation has taken place during fiscal expansions, indicating that budget adjustment differs across countries. This could be the reason explaining the deceleration of the convergence process observed after 1980, a period in which most of the OECD countries have stabilised the share of public spending in the GDP.

This convergence has been more significant for public services –which include general administration services and public order-, while the share of education in total expenditures is the more similar between OECD member states. Anyway, the most relevant result is that in 1997 the margin for future convergence seems to be very small, that is, functions appear to be close to the steady-state, which is different for each country. So there are individual factors which determine that each country has its own

[12] The Kendall indexes obtained are significant at 1% level until 1990. Afterwards, several of them are significant at 2,5% level. The test is a chi-square with n-1 countries of degrees of freedom.

functional distribution of public expenditure in the long term. These factors could be demographic, institutional, sociological or even geographical.

This conclusion is relevant considering that the endogenous growth models stress the composition of public expenditure as one of its determinants. Certainly, the factors preventing the absolute convergence of functional distribution of government expenditure could be giving rise to different long term economic growth rates in developed countries. Therefore, the next step of this research would be the analysis of the factors determining differences in the functional distribution of government expenditures.

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APPENDIX 1. RESULTS OF THE CONVERGENCE ESTIMATIONS FOR EACH FUNCTION OF THE GOVERNMENT EXPENDITURES

β CONVERGENCE IN PUBLIC SERVICES EXPENDITURE

	1970-1998		1970-1979		1980-1989		1990-1997	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
β	-0.25 (-2.60)	-0.11 (-6.82)	-0.12 (-0.91)	-0.03 (-1.05)	-0.76 (-2.97)	-0.15 (-5.01)	-0.63 (-2.20)	-0.13 (-4.68)
n observations	702	702	234	234	260	260	208	208
adjusted R^2	0.13	0.06	0.20	0.00	0.48	0.09	0.25	0.10
Hausman Test	49,86 $\chi 2(1)$		4.61 $\chi 2(1)$		192.10 $\chi 2(1)$		29.49 $\chi 2(1)$	
F ($\alpha_i=\alpha$)	0,98 F(25,675)							
σ steady state values	0.32							
σ real values	0.23							

Chow Test F ($\beta_t=\beta$)		
70s vs 80s	70s vs 90s	80s vs 90s
2.19 F(1,466)	1.33 F(1,414)	0.22 F(1,440)

β-CONVERGENCE IN HEALTH EXPENDITURE

	1970-1998		1970-1979		1980-1989		1990-1997	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
β	-0.12 (-5.30)	-0.01 (-1.52)	-0.24 (-3.53)	-0.02 (-2.3)	-0.39 (-4.59)	0.01 (1.18)	-0.40 (-3.56)	-0.02 (-1.94)
n observations	702	702	234	234	260	260	208	208
adjusted R^2	0.13	0.00	0.33	0.02	0.38	0.01	0.32	0.02
Hausman Test	69.58 $\chi 2(1)$		32.33 $\chi 2(1)$		114.08 $\chi 2(1)$		54.86 $\chi 2(1)$	

F ($\alpha_i=\alpha$)	3.27 F(25,675)
σ steady-state values	0.31
σ real values	0.32

Chow Test F ($\beta_t=\beta$)		
70s vs 80s	70s vs 90s	80s vs 90s
4.5 F(1.466)	1.0 F(1,414)	1.71 F(1,440)

β-CONVERGENCE IN SOCIAL SECURITY EXPENDITURE

	1970-1998		1970-1979		1980-1989		1990-1997	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
β	-0.13 (-3.39)	-0.02 (-3.50)	-0.68 (-4.73)	-0.02 (-1.79)	-0.46 (-2.97)	-0.00 (-0.29)	-0.20 (-1.00)	-0.07 (-7.43)
n observations	702	702	234	234	260	260	208	208
adjusted R^2	0.07	0.02	0.295	0.01	0.38	0.00	0.31	0.21
Hausman Test	30.87 χ2(1)		127.74 χ2(1)		127.41 χ2(1)		4.91 χ2(1)	
F (α_i=α)	1.70 F(25,675)							
σ steady-state values	0.37							
σ real values	0.33							

Chow Test F (β_t=β)		
70s vs 80s	70s vs 90s	80s vs 90s
0.2 F(1,466)	2.4 F(1,414)	5.5 F(1,440)

β-CONVERGENCE IN EDUCATION EXPENDITURE

	1970-1998		1970-1979		1980-1989		1990-1997	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
β	-0.09 (-4.58)	-0.06 (-5.84)	-0.20 (-2.82)	-0.08 (-4.94)	-0.32 (-4.75)	-0.08 (-4.11)	-0.28 (-4.32)	-0.02 (-0.89)
n observations	702	702	234	234	260	260	208	208
adjusted R^2	0.13	0.04	0.33	0.10	0.26	0.06	0.31	0.00
Hausman Test	12.48 $\chi 2(1)$		14.60 $\chi 2(1)$		35.51 $\chi 2(1)$		45.06 $\chi 2(1)$	

F ($\alpha_i=\alpha$)	1.54 F(25,675)	Chow Test F ($\beta_t=\beta$)		
σ steady-state values	0.22	70s vs 80s	70s vs 90s	80s vs 90s
σ real values	0.26	14.1 F(1,466)	0.3 F(1,414)	2.5 F(1,440)

β-CONVERGENCE IN DEFENCE EXPENDITURE

	1970-1998		1970-1979		1980-1989		1990-1997	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
β	-0.18 (-7.94)	-0.02 (-4.06)	-0.22 (-6.66)	-0.05 (-4.17)	-0.40 (-6.96)	-0.02 (-1.51)	-0.36 (-5.32)	-0.03 (-3.05)
n observations	675	620	225	225	250	250	200	200
adjusted R^2	0.17	0.02	0.58	0.04	0.31	0.01	0.36	0.04
Hausman Test	79.10 χ2(1)		70.70 χ2(1)		81.98 χ2(1)		44.37 χ2(1)	
F ($\alpha_i=\alpha$)	4,27 F(25,649)							
σ steady-state values	0.62							
σ real values	0.53							

Chow Test F ($\beta_t=\beta$)		
70s vs 80s	70s vs 90s	80s vs 90s
14,5 F(1,488)	4,3 F(1,398)	24.1 F(1,423)

β-CONVERGENCE IN TRANSPORT AND COMMUNICATIONS EXPENDITURE

	1970-1998		1970-1979		1980-1989		1990-1997	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
β	-0.16 (-4.46)	-0.36 (-3.59)	-0.35 (-3.92)	-0.05 (-2.78)	-0.27 (-3.40)	-0.03 (-2.00)	-0.31 (-3.73)	-0.04 (-1.86)
n observations	702	702	234	234	260	260	208	208
adjusted R^2	0.10	0.02	0.31	0.03	0.20	0.02	0.28	0.01
Hausman Test	47.01 $\chi 2(1)$		58.46 $\chi 2(1)$		32.37 $\chi 2(1)$		22.28 $\chi 2(1)$	
F ($\alpha_i=\alpha$)	1,61 F(25,675)							
σ steady-state values	0,47							
σ real values	0,60							

Chow Test F ($\beta_t=\beta$)		
70s vs 80s	70s vs 90s	80s vs 90s
0.82 F(1,466)	1,09 F(1,414)	0,84 F(1,440)

β-CONVERGENCE IN HOUSING EXPENDITURE

	1970-1998		1970-1979		1980-1989		1990-1997	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
β	-0.20 (-2.76)	-0.05 (-3.83)	-0.37 (-3.01)	-0.05 (-2.57)	-0.36 (-4.10)	-0.05 (-2.40)	-0.43 (-2.39)	-0.05 (-1.80)
n observations	692	692	225	225	259	259	208	208
adjusted R^2	0.11	0.02	0.22	0.03	0.22	0.02	0.29	0.02
Hausman Test	55.81 $\chi 2(1)$		32.63 $\chi 2(1)$		42.95 $\chi 2(1)$		54.34 $\chi 2(1)$	
F ($\alpha_i=\alpha$)	1.15 F(25,665)							
σ steady-state values	0.49							
σ real values	0.52							

Chow Test F ($\beta_t=\beta$)		
70s vs 80s	70s vs 90s	80s vs 90s
0.12 F(1,456)	0.09 F(1,405)	0.07 F(1,439)

β-CONVERGENCE IN OTHER EXPENDITURE

	1970-1998		1970-1979		1980-1989		1990-1997	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
β	-0.09 (-2.89)	-0.02 (-2.13)	-0.31 (-4.93)	-0.02 (-1.28)	-0.33 (-5.40)	-0.02 (-1.66)	-0.30 (-2.65)	-0.03 (-1.17)
n observations	702	702	234	234	260	260	208	208
adjusted R^2	0.06	0.01	0.21	0.01	0.21	0.01	0.24	0.00
Hausman Test	15.04 $\chi 2(1)$		33.51 $\chi 2(1)$		40.06 $\chi 2(1)$		24.07 $\chi 2(1)$	
F ($\alpha_i=\alpha$)	1,20 F(25,675)							
σ steady-state values	0.49							
σ real values	0.56							

Chow Test F ($\beta_t=\beta$)		
70s vs 80s	70s vs 90s	80s vs 90s
1.54 F(1,466)	1.79 F(1,414)	1.59 F(1,440)